1 (currently amended). A method for providing for transport of thermal energy from an object, the method comprising:

providing an array of carbon nanotubes or carbon nanofibers, referred to herein as "CNTs," embedded in or connected to a selected surface of a selected substrate having high thermal conductivity, where at least first and second CNTs in the array are adjacent to and are oriented substantially perpendicular to the selected surface;

after provision of the at least first and second CNTs in the array, filling at least a portion of an interstitial space between the at least ~~two adjacent~~ first and second CNTs in the array with a selected filler material that has high thermal conductivity so that the filler material makes contact with the selected substrate surface at a first end of each of the at least first and second CNTs and a second end of each of the at least first and second CNTs is exposed and is not fully covered by the filler material; and

causing the exposed second ends of the at least first and second CNTs to make contact with a surface of an object for which transport of thermal energy is to be provided so that at least one of the exposed second ends of the CNTs bends or buckles, whereby thermal energy is removed from the object through the at least first and second CNTs and a portion of the removed thermal energy is distributed within the filler material.

2 (canceled).

3 (original). The method of claim 1, further comprising selecting said filler material to include at least one of Cu, Ag, Au, Pt, Pd and a metal-doped silicide.

4 (original). The method of claim 1, further comprising providing a layer of a selected catalyst, including at least one of Ni, Fe, Co, Pt and Al, for growth of said array of said CNTs, on said selected surface of said catalyst.

5 (original). The method of claim 1, further comprising filling said portion of said interstitial space with said filler material by a process comprising at least one of chemical vapor deposition, physical vapor deposition, plasma deposition, ion sputtering, electrochemical deposition and casting from a liquid phase.

6 (original). The method of claim 1, further comprising providing said exposed second ends of said at least first and second CNTs by a process comprising at least one of mechanical polishing, chemical-mechanical polishing, wet chemical etching, electrochemical etching and dry plasma etching.

7 (currently amended). Apparatus for providing for transport of thermal energy from an object, the apparatus comprising:

an array of carbon nanotubes or carbon nanofibers, referred to herein as "CNTs," embedded in or connected to a selected surface of a selected substrate having high thermal conductivity, where at least first and second CNTs in the array are adjacent to and are oriented substantially perpendicular to the selected surface;

a high thermal conductivity material that fills at least a portion of an interstitial space between at least ~~two adjacent~~ the at least first and second CNTs in the array so that the filler material makes contact with the selected substrate surface at a first end of each of the at least first and second CNTs and a second end of each of the at least first and second CNTs is exposed and is not fully covered by the filler material; and

wherein the exposed second ends of the at least first and second CNTs make contact with a surface of an object for which transport of thermal energy is to be provided so that at least one of the exposed second ends of the CNTs bends or buckles, whereby thermal energy is removed from the object through the at least first and second CNTs and a portion of the removed thermal energy is distributed within the filler material.

8 (canceled).

9 (original). The apparatus of claim 7, wherein said filler material includes at least one of Cu, Ag, Au, Pt, Pd and a metal-doped silicide.

10 (original). The apparatus of claim 7, further comprising a layer of a selected catalyst, including at least one of Ni, Fe, Co, Pt and Al, deposited on said selected substrate surface for growth of said array of said CNTs, on said selected substrate.

11 (original). The apparatus of claim 7, wherein said portion of said interstitial space is filled with said filler material by a process comprising at least one of chemical vapor deposition, physical vapor deposition, plasma deposition, ion sputtering, electrochemical deposition and casting from a liquid phase.

12 (original). The apparatus of claim 7, wherein said exposed second ends of said at least first and second CNTs are provided by a process comprising at least one of mechanical polishing, chemical-mechanical polishing, wet chemical etching, electrochemical etching and dry plasma etching.

13 (previously presented). The method of claim 1, further comprising providing said exposed ends of said first and second CNTs in said array with an exposed first length and an exposed second length, respectively, that are not covered by said filler material, where the exposed first length and the exposed second length are substantially equal.

14 (previously presented). The method of claim 1, further comprising providing said exposed ends of said first and second CNTs in said array with an exposed first length and an exposed second length, respectively, that are not covered by said filler material, where the exposed first length is greater than the exposed second length.

15-17 (canceled).

18 (original). The method of claim 1, further comprising providing for said transport of said thermal energy from said object with an associated thermal resistance of no more than about 8 cm^2-K/Watt.

19 (original). The method of claim 1, further comprising providing for said transport of said thermal energy from said object with an associated thermal resistance of no more than about 0.1 cm^2-K/Watt.

20 (previously presented). The apparatus of claim 7, wherein said exposed ends of said first and second CNTs in said array have an exposed first length and an exposed second length, respectively, that are not covered by said filler material, where the exposed first length and the exposed second length are substantially equal.

21 (previously presented). The apparatus of claim 7, wherein said exposed ends of said first and second CNTs in said array have an exposed first length and an exposed second length, respectively, that are not covered by said filler material, where the exposed first length is greater than the exposed second length.

22-24 (canceled).

25 (original). The apparatus of claim 7, wherein said transport of said thermal energy from said object occurs with an associated thermal resistance of no more than about 8 cm^2-K/Watt.

26 (original). The apparatus of claim 7, wherein said transport of said thermal energy from said object occurs with an associated thermal resistance of no more than about 0.1 cm^2-K/Watt.

27 (new). The method of claim 1, further comprising removing said thermal energy from said object initially through said exposed second ends of said at least first and second CNTs in contact with said object, and subsequently through said filler material that makes contact with said at least first and second CNTs.

28 (new). The method of claim 1, further comprising removing said thermal energy from said object contemporaneously through said exposed second ends of said at least first and second CNTs in contact with said object and through said filler material that makes contact with said at least first and second CNTs.

29 (new). The method of claim 1, further comprising providing said object with a surface for said contact that is rough on an atomic scale and is not substantially planar.

30 (new). The apparatus of claim 7, wherein said thermal energy is removed from said object initially through said exposed second ends of said at least first and second CNTs in contact with said object, and subsequently through said filler material that makes contact with said at least first and second CNTs.

31 (new). The apparatus of claim 7, wherein said thermal energy is removed from said object contemporaneously through said exposed second ends of said at least first and second CNTs in contact with said object and through said filler material that makes contact with said at least first and second CNTs.

32 (new). The apparatus of claim 7, wherein said object has a surface for said contact that is rough on an atomic scale and is not substantially planar.

33 (new). An apparatus for providing for transport of thermal energy from an object, the apparatus comprising:

an array of carbon nanotubes or carbon nanofibers, referred to herein as "CNTs," on a surface of a substrate, wherein at least first and second CNTs in the array are oriented substantially perpendicular to the surface of the substrate; and

a filler material that fills at least a portion of an interstitial space between the at least first and second CNTs in the array;

wherein:

the filler material makes contact with the surface of the substrate at a first end of each of the at least first and second CNTs;

a second end of each of the at least first and second CNTs is exposed and is not fully covered by the filler material;

the exposed second ends of the at least first and second CNTs are configured to make contact with a surface of an object for which transport of thermal energy is to be provided so that at least one of the exposed second ends of the CNTs bends or buckles; and

the thermal resistance of the apparatus is no more than about 0.9 cm^2K/W.

34 (new). An apparatus for providing for transport of thermal energy from an object, the apparatus comprising:

an array of carbon nanotubes or carbon nanofibers, referred to herein as "CNTs," on a surface of a substrate, wherein at least first and second CNTs in the array are oriented substantially perpendicular to the surface of the substrate; and

a filler material that fills at least a portion of an interstitial space between the at least first and second CNTs in the array;

wherein:

the filler material makes contact with the surface of the substrate at a first end of each of the at least first and second CNTs;

the at least first and second CNTs each have a respective second end that is different from each respective first end;

the respective second ends of the at least first and second CNTs are configured to make contact with a surface of an object for which transport of thermal energy is to be provided so that at least one of the respective second ends of the CNTs bends or buckles; and

the thermal resistance of the apparatus is no more than about 0.9 cm^2K/W.

35 (new). The apparatus of claim 34, wherein the apparatus is configured to make contact with the surface of the object with a contact pressure of no more than 20 psi.

36 (new). The apparatus of claim 34, wherein the thermal resistance of the apparatus is no more than about 0.1 cm^2K/W.

37 (new). A method for making an apparatus for transporting thermal energy from an object, the method comprising:

providing an array of carbon nanotubes or carbon nanofibers, referred to herein as "CNTs," on a surface of a substrate, wherein at least first and second CNTs in the array are oriented substantially perpendicular to the surface of the substrate; and

after providing the array of CNTs, filling at least a portion of an interstitial space between the at least first and second CNTs in the array with a filler material;

wherein:

the filler material makes contact with the surface of the substrate at a first end of each of the at least first and second CNTs;

the at least first and second CNTs each have a respective second end that is different from each respective first end;

the respective second ends of the at least first and second CNTs are configured to make contact with a surface of an object for which transport of thermal energy is to be provided so that at least one of the respective second ends of the CNTs bends or buckles; and

the thermal resistance of the apparatus is no more than about 0.9 cm^2K/W.

38 (new). A method for transporting thermal energy from an object, the method comprising:

contacting an object with an apparatus comprising an array of carbon nanotubes or carbon nanofibers, referred to herein as "CNTs," and a filler material that fills at least a portion of an interstitial space between at least first and second CNTs in the array, wherein:

the filler material makes contact with a surface of a substrate at a first end of each of the at least first and second CNTs;

the at least first and second CNTs in the array are oriented substantially perpendicular to the surface of the substrate;

the at least first and second CNTs each have a respective second end that is different from each respective first end;

the respective second ends of the at least first and second CNTs make contact with a surface of the object so that at least one of the respective second ends of the CNTs bends or buckles; and

the thermal resistance of the apparatus is no more than about 0.9 cm^2K/W; and

transporting thermal energy from the object with the array of CNTs and the filler material.

Respectfully Submitted,

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